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APPLICATION NUMBER: *60/564,091*
FILING DATE: *April 21, 2004*
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Certified by

Jon W. Dudas

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PROVISIONAL APPLICATION FOR PATENT COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

Express Mail Label No. EV333441091US

INVENTOR(S)		
Given Name (first and middle [if any])	Family Name or Surname	Residence (City and either State or Foreign Country)
Jianming	Xu	Plano, TX

Additional inventors are being named on the 1 *separately numbered sheets attached hereto*

TITLE OF THE INVENTION (500 characters max)

Media Gateway Interconnect Routing In a Softswitch Environment

Direct all correspondence to: **CORRESPONDENCE ADDRESS**

☑ Customer Number: 000027683

OR

☐ Firm or Individual Name					
Address	Haynes and Boone, LLP				
Address	901 Main Street, Suite 3100				
City	Dallas	State	TX	Zip	75202
Country	USA	Telephone	972 7398638	Fax	214-200-0853

ENCLOSED APPLICATION PARTS *(check all that apply)*

☑ Specification *Number of Pages* 14 ☐ CD(s), Number

☑ Drawing(s) *Number of Sheets* incorporated into App ☑ Other (specify) Return Postcard

☑ Application Date Sheet. See 37 CFR 1.76

METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT

☑ Applicant claims small entity status. See 37 CFR 1.27.

☑ A check or money order is enclosed to cover the filing fees.

☐ The Director is herby authorized to charge filing fees or credit any overpayment to Deposit Account Number: 08-1394

☐ Payment by credit card. Form PTO-2038 is attached.

FILING FEE Amount ($): 80.00

The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

☑ No.

☐ Yes, the name of the U.S. Government agency and the Government contract number are:

Respectfully submitted,

SIGNATURE T. F. Bliss

TYPED or PRINTED NAME Timothy F. Bliss

TELEPHONE 972 739-8638

Date April 21, 2004

REGISTRATION NO. 50,925 *(if appropriate)*

Docket Number: 29981.76

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PROVISIONAL APPLICATION COVER SHEET
Additional Page

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Docket Number 29981.76

INVENTOR(S)/APPLICANT(S)

Given Name (first and middle [if any])	Family or Surname	Residence (City and either State or Foreign Country)
Brahmananda	Vempati	Dallas, TX

Number _____ of _____

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Xu, et al.	§	Attorney Docket No. 29981.76
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	§	Customer No. 27683
Serial No. Unknown	§	
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For: Media Gateway Interconnect Routing in a Softswitch Environment	§	
	§	

EXPRESS MAIL CERTIFICATE

Mail Stop Provisional Patent Application
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

I hereby certify that the following attached papers and fee:

1. Provisional Application for Patent Cover Sheet (in duplicate);
2. Provisional Patent Application consisting of 14 pages of specification,
3. Drawing sheets, incorporated into the Application;
4. Application Data Sheet;
5. Check in the amount of $80.00; and
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are being deposited with United States Postal Service "Express Mail Post Office to Addressee" via **Express Mail Number: EV333441091US** to the Commissioner for Patents, Box Provisional Patent Application, Alexandria, VA 22313-1450, on the **21st day of April, 2004.**

Gayle Conner
Typed or Printed Name

Gayle Conner
Signature

PROVISIONAL PATENT
Attorney Docket No.: 29981.76
Customer No.: 27683

EXPRESS MAIL NO.: EV333441091US DATE OF DEPOSIT: April 21, 2004

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Gayle Conner
Name of person mailing paper and fee

Gayle Conner
Signature of person mailing paper and fee

MEDIA GATEWAY INTERCONNECT ROUTING IN A SOFTSWITCH ENVIRONMENT

Inventors: Jianming Xu
4305 Vanderpool Drive
Plano, Texas 75024
Citizenship: USA

Brahmananda Vempati
18852 Haddington Ln
Dallas, TX 75287
Citizenship: USA

Assignee: Spatial Communication Technologies, Inc.
1651 Glenville Drive, Suite 216
Richardson, Texas 75080

HAYNES AND BOONE, LLP
901 Main Street, Suite 3100
Dallas, Texas 75202-3789
(214) 651-5000

Attorney Docket No. 29981.76
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MEDIA GATEWAY INTERCONNECT ROUTING IN A SOFTSWITCH ENVIRONMENT

WRITTEN DESCRIPTION

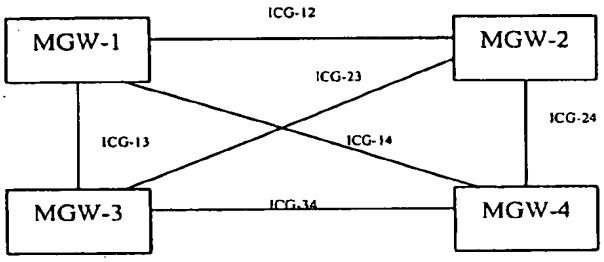
The present disclosure relates generally to voice and data communications and, more particularly, to a wireless system and method for media gateway interconnect routing in a softswitch environment.

It is to be understood that the following disclosure provides many different embodiments, or examples, for implementing different features of the disclosure. Specific examples of components and arrangements are described below to simplify the present disclosure. These are, of course, merely examples and are not intended to be limiting. In addition, the present disclosure may repeat reference numerals and/or letters in the various examples. This repetition is for the purpose of simplicity and clarity and does not in itself dictate a relationship between the various embodiments and/or configurations discussed.

TABLE OF CONTENTS

1 INTRODUCTION

This document describes exemplary features for routing among media gateways using a telecommunications product (or combination of products), such as a Spatial Wireless Atrium product. In some examples, the interconnection between media gateways within a call server may use TDM, IP, and/or ATM as physical interconnections. In the TDM network, a simple routing mechanism may be used from one media gateway to another media gateway as shown in the following diagram:



For example, from MG-1 to MG-4, only one route {ICG-14} is implemented currently. In the event of unavailability of the TDM circuits between media gateways, the call could be routed through an alternate route with bypass the media gateway cloud. This may limit the best advantage of long distance bypass that is achieved via some solutions.

For the sake of transmission redundancy, multi-routes within media gateway may be needed from one media gateway to another media gateway under the same call server.

1.1 DEFINITIONS AND ACRONYMS

ICT	InterConnection Trunk
ICR	InterConnection Route
ICRL	InterConnection Route List
CDR	Call Detail Record
EMS	Element Management System
GMSC	Gateway Mobile Switching Center
DMSC	Distributed Mobile Switching Center
MGW	Media Gateway
VMSC	Visiting Mobile Switching Center
WSS	Wireless Soft-Switch

2 EXEMPLARY FEATURE GENERAL DESCRIPTION

In some embodiments, a routing enhancement feature may be used to address the routing enhancements between media gateways within one call server as illustrated in the following network diagram:

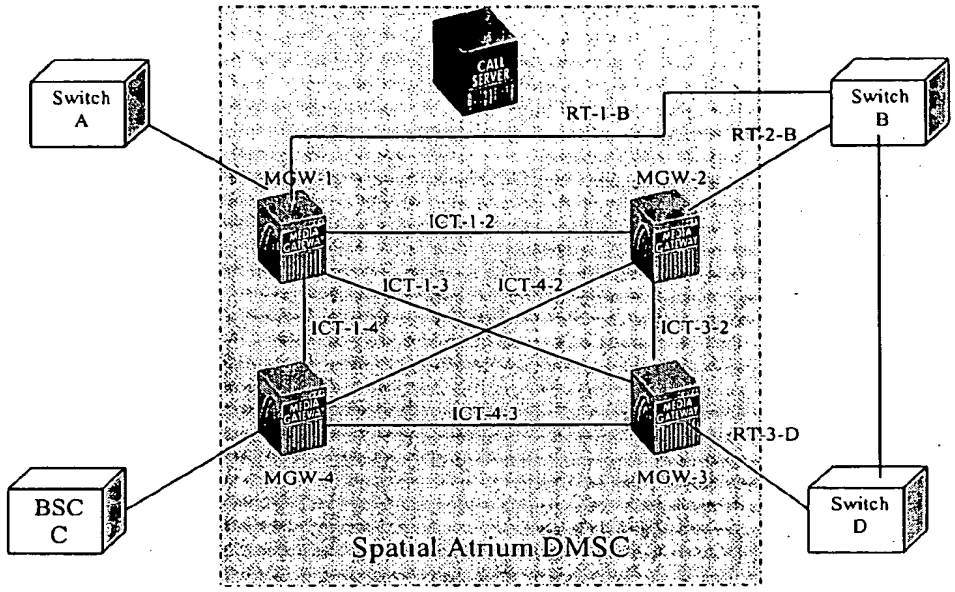


Figure 1 - Network Diagram

In the above diagram, a DMSC (e.g., a Spatial Atrium DMSC) may work logically as one switch from the external network's point of view. Multiple routes may be designed to provide network redundancy from any network entity and another network entity in the same way as with a legacy switch.

For example, when a call arrives at the MGW-1 from switch A, the Ergress trunk is identified from media gateway 2 to switch B for the call to hop to the next switch. A route from MGW-1 to MGW-2 may need be located as part of the route selection to the external switch B. An interconnection route (ICR) list may be defined from MGW-1 to MGW-2 for the route selection.

For example,

ICRL (Interconnection Route List) from MGW-1 to MGW-2 = {ICG-1-2, {ICG-1-4, ICG-4-2}, {ICG-1-3, ICG-3-2}};

Calls that arrive at the MGW-1 from switch A may be subject to subject to restrictive and preferential routing, which may apply to some or all of the external routes.

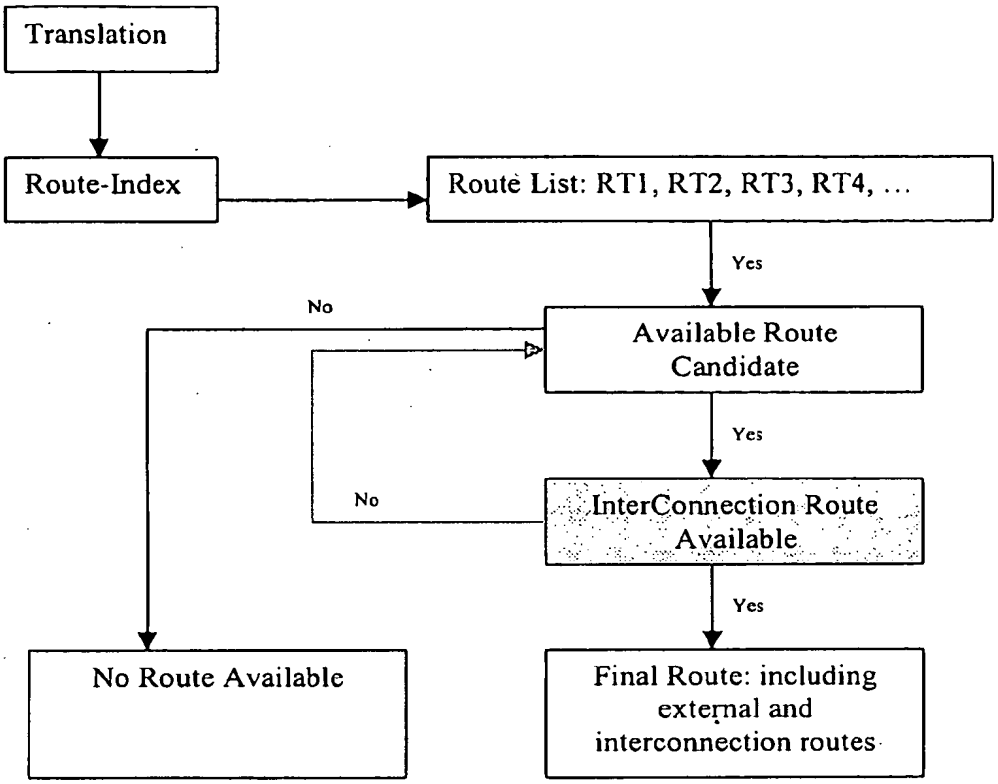
An interconnection route list (ICRL) may be defined as the collection of the designated routes from one media gateway to another media gateway.

Interworking with the external route list:

For any outgoing call from a device such as a Spatial Atrium device, a route list (external) may be identified to route the call to the next switch. For example, routes to switch B include RT-1-B, RT-3-D, RT-2-B.

When an external route (e.g., RT-1-B) is the candidate for the outgoing call, the external resource is available for the call. But the internal ICRL may be checked first to ensure there are resources available for the interconnection before the final allocation for the outgoing call. In the case of the RT-1-B, no interconnection is required. In the case of RT-2-B, the ICRL between MGW-1 and MGW-2 may be checked to ensure the availability of the interconnection route.

Exemplary logic of route selection in such a device (e.g., a Spatial Atrium device) may be depicted as follows:

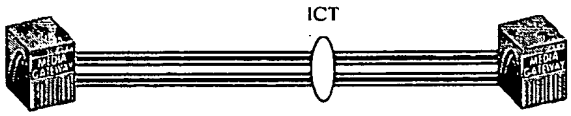


3 EXEMPLARY FUNCTIONAL DESCRIPTIONS

3.1 THE INTERCONNECTION TRUNK (ICT)

The InterConnection trunk (ICT) may be one-way (directional) and two-way as part of its attributes.

The interconnection trunk (ICT) may be defined as the trunk between two media gateways.



3.1.1 Size of the ICT

In the present example, up to 16K circuits may be supported per ICT trunk. At most, two directional ICT trunks may exist between any two media gateways within a call server.

3.1.2 The ICT states

The following exemplary information may be provided on the ICT facility:

- ✓ Group ID;
- ✓ Group type;
- ✓ Name;
- ✓ Admin state
- ✓ Active channels
- ✓ OOS channels

3.1.3 The ICT attributes

The following exemplary ICT attributes may be provided as attributes:

- ✓ COT Freq {None, 1, 5, 10, ... 20, 50, 100};
- ✓ Milliwatt test
- ✓ Bearer Type {voice, 3.1Khz, UDI/RDI};
- ✓ Direction {one-way, two-way};
- ✓ Guard-Timer {None, 0.25s, 0.5s, ..., 1.75s};
- ✓ OOS Alarm Threshold

- Critical
- Major
- Minor

When the COT or Milliwatt test is selected, the test may be performed on the selected circuit between two media gateways.

3.1.4 Circuit Selection Process from the ICR

Exemplary circuit selection processes may include:

- ✓ Sequential

The sequential selection may be used to select circuits from the ICR initially, although it is understood that other processes, such as the most-idle approach, may also be implemented.

3.1.5 Circuit Test

The following procedure may be applied to the ICG circuits in the same way as ISUP circuits except that there are no external ISUP signaling messages involved:

✓ COT

Periodic COT may need to be performed on the ICG circuits. In addition, as part of COT request from the external switch via ISUP message, the internal COT procedure may need to be applied to the selected circuit as well.

✓ Milliwatt Test

Periodic Milliwatt test may need to be performed on the ICG circuits in the same way as ISUP circuit.

3.2 INTERCONNECT ROUTE (ICR)

3.2.1 The ICR

The Interconnection Route (ICR) may include a list of ICT trunks that link together two media gateways with each circuit from the ICT trunks within one call server.

For example, one ICR route from MGW1 to MGW3 is {ICT-1-2, ICT-2-3}. Another route from MGW1 to MGW3 is {ICT-1-3}.

The link selection from one ICR route depends on the circuit selection from each individual ICT trunk. See the circuit selection in the ICT for additional details.

3.3 INTERCONNECT ROUTE LIST (ICRL)

3.3.1 InterConnect Route List

The InterConnect Route List may include an ordered list of the interconnect routes (ICR) from one media gateway to another. The ordered list may be provisioned for inter media gateway traffic.

3.3.2 Route selection processes

The Interconnection Route Selection Processes:

- ✓ In sequential order

  The ICR may be selected based on the order in the ICRL. When one ICR is exhausted, the subsequent ICR in the ICRL may be used until the exhaustion of the ICRL list. If so, no interconnection circuit is available. Depending on the external route selection, a different external route may need to be located.

- ✓ Percentage approach

  All ICR routes in the ICRL may be given a percentage. The measure interval uses 100 calls for the ICRL. The allocation of the ICR is in the order arranged in the ICRL list with the arranged number of calls (100*allocated percentage).

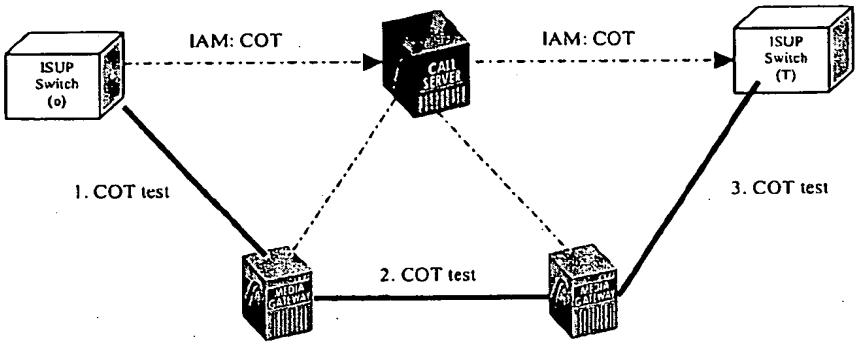
3.4 COT TEST PROCEDURE

The COT procedure may be performed based on the following criteria:

- ✓ Triggered upon the external COT request from the incoming call
- ✓ Triggered upon the internal periodic setting

The call server may manage the COT testing internally.

3.4.1 Triggered from the external ISUP message



The first COT test between the originating switch and the MGW-1 may be performed before sending out the outgoing IAM message. The second COT test procedure may be performed as part of the Interconnect route selection procedure. In the event of COT failure for the inter media gateways, an alternate circuit or route may be selected for the call. The circuit that failed the COT testing may be marked as OOS.

After the success of the second COT, the outgoing IAM message may be sent out the next switch. As a result, the third COT test may be performed. The ISUP COT procedure may be followed.

In the event of COT failure, an alternate circuit or route may be selected. As a result, an alternate inter media gateway route may be selected. If so, the inter-media gateway COT may be performed on the associated circuits of the inter-media gateway link.

3.4.2 Triggered from the internal event

As part of TDM transmission management, a COT test may be performed periodically to ensure the availability of the circuits.

At the scheduled COT test event, the COT test may be performed as configured by the media gateway.

3.5 MILLIWATT TEST PROCEDURE

The Milliwatt test may be performed per ICT trunk if provisioned.

3.6 FAULTS AND ALARMS HANDLING

Alarms may be generated when OOS circuits surpass the pre-defined threshold value. For example, three levels of alarm may defined each ICT trunk: critical, major and minor.

3.7 OPERATION MEASUREMENTS

The following OM pegs may be collected:

ICT:

- ✓ Usage in Erlang
- ✓ Call attempts
- ✓ Call successful
- ✓ Call overflow due to congestion – This indicates the instances of unavailable circuit assignment upon request to the ICT trunk;
- ✓ In service channels - This OM indicates total in service channels in the ICT.
- ✓ OOS Erlang - This OM indicates the total of OOS Erlang of all channels in the ICT.
- ✓ High water mark active channels – the high water mark number of active channels in use.

The Interconnection Route (ICR):

- ✓ Usage in Erlang
- ✓ Call attempts
- ✓ Call success
- ✓ Call Overflow due to congestion – This indicates the instances of unavailable link assignment from the ICR.

3.8 BILLING

There may be no impact in some embodiments.

4 EXEMPLARY SYSTEM IMPACT

4.1 SOFT-SWITCH

There may impact on the WSS, especially in the following functional modules:

- Facility Manager (FM)
- Call Manager (CpCallM)
- OAM configuration Manager (OAMCfg)
- EMS server
- EMS GUI

4.2 MEDIA GATEWAY

In some embodiments, there may be no impact.

5 EXEMPLARY SYSTEM PERFORMANCE

5.1 RELIABILITY

In some embodiments, there may be no impact on the system reliability. As a result of this feature, network reliability is thus increased through multi-routes between media gateways.

5.2 CAPACITY

In some embodiments, due to additional logic, the real-time capacity may be slightly impacted.

Accordingly, while the disclosure has been particularly shown and described with reference to specific examples, it will be understood by those skilled in the art that various changes in form and detail may be made therein without departing from the spirit and scope of the disclosure. It is understood that several modifications, changes and substitutions are intended in the foregoing disclosure and in some instances some features of the disclosure will be employed without a corresponding use of other features. For example, various steps in the above described methods may be combined, further divided, or eliminated entirely. Furthermore, steps may be performed in any order, and steps described with respect to different methods may be combined into a single method. In addition, data flows other than those illustrated may be used to provide identical or similar functionally. Accordingly, it is appropriate that the appended claims be construed broadly and in a manner consistent with the scope of the disclosure.

WHAT IS CLAIMED IS:

1. A system and method for media gateway interconnect routing in a softswitch environment substantially as herein described and illustrated in the accompanying drawings.